

Appl. No. 09/605,227  
Amdt. Dated July 29, 2004  
Reply to Office Action of May 3, 2004

Attorney Docket No. 81870.0009  
Customer No.: 26021

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Previously presented) An optical module comprising:  
a substrate having a planar main surface and a groove in the main surface of the substrate;  
an electric connection terminal provided on the substrate;  
an optical element completely provided on the planar main surface of the substrate, the optical element being electrically connected with the electric connection terminal,  
wherein the optical element is mounted on the planar main surface of the substrate, and the substrate has a coupling portion to be coupled with a connector through which the optical element is electrically connected with an electric circuit board; and  
one end of a slender light transmitter fixed in the groove and optically coupled with the optical element,  
wherein the light transmitter immediately adjacent to the optical element is fixed in the groove.
2. (Previously presented) The optical module according to claim 1, wherein the substrate includes a first base member and a second base member, the first base member being provided with the electric connection terminal, and the second base member having the planar main surface and being provided with the optical element and the slender light transmitter.

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3. (Original) The optical module according to claim 2, wherein the second base member is mounted on the first base member.

4. (Original) The optical module according to claim 1, further comprising a protector formed on the substrate for protecting the optical element and the slender light transmitter.

5. (Previously presented) An optical module comprising:  
a substrate having a planar main surface and a groove in the main surface of the substrate;

an electric connection terminal provided on the substrate;  
a planer lightwave circuit completely provided on the main surface of the substrate, the planer lightwave circuit being electrically connected with the electric connection terminal,

wherein the planer lightwave circuit is mounted on the planar main surface of the substrate; and

an optical fiber partially provided in the groove and optically coupled with the planer lightwave circuit,

wherein the optical fiber immediately adjacent to the planer lightwave circuit is fixed in the groove, and the substrate has a coupling portion to be coupled with a connector through which the planar lightwave circuit is electrically connected with an electric circuit board.

6. (Original) The optical module according to claim 5, wherein the substrate including a first base member and a second base member, the first base member being provided with the electric connection terminal, and the second base member being provided with the planer lightwave circuit and the optical fiber.

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7. (Currently amended) A combination comprising:

a connector including a ~~receptacle~~ receptacle, a module connection terminal, and a circuit board connection terminal electrically connected with the module connection terminal and connectable with an electric circuit board; and

an optical module including:

a substrate having a planar main surface, a groove in the main surface of the substrate, and a coupling portion to be received in the receptacle of the connector for the coupling of the connector and the optical module;

an electric connection terminal provided on the substrate, at such a position to be electrically connected with the module connection terminal of the connector when the coupling portion of the substrate is received in the receptacle;

an optical element completely provided on the main surface of the substrate, the optical element being connected with the electric connection terminal,

wherein the optical element is mounted on the planar main surface of the substrate; and

one end of a slender light transmitter fixed in the groove and optically coupled with the optical element,

wherein the light transmitter immediately adjacent to the optical element is fixed in the groove.

8. (Previously presented) The combination according to claim 7, wherein the substrate includes a first base member and a second base member, the first base member being provided with the module connection terminal, and the second base member being provided with the optical element and the slender light transmitter.

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9. (Previously presented) The combination according to claim 8, wherein:

the module connection terminal is provided at a leading end of the first base member which serves as the coupling portion; and

the connector is formed with a reception space which serves as the receptacle, and the circuit board connection terminal is adapted to be connected with an electric circuit board by soldering.

10. (Previously presented) A combination according to claim 9, wherein the receptacle is opened to the electric circuit board.

11. (Previously presented) A combination according to claim 10, wherein the module connection terminal of the connector has a form of a spring and is exposed to the receptacle.

12. (Previously presented) A combination according to claim 8, wherein a main body of the connector is made of a material having a thermal conductivity higher than that of the first base member.

13-15. (Canceled)

16. (Original) A combination according to claim 7, wherein the optical module is further provided with a protector on the substrate for protecting the optical element and the slender light transmitter.

17. (Original) A combination according to claim 7, wherein a main body of the connector is made of a material having a thermal conductivity higher than the substrate.

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18. (Currently amended) An optical module comprising:  
a package casing provided with an electric terminal on a surface thereof, the package casing having a mount space;

a substrate having a planar main surface and a groove in the main surface of the substrate, bearing an optical element, an electrode drawn from the optical element, and one end of a slender light transmitter, the optical element and the one end of the slender light transmitter being fixedly attached on the substrate and optically coupled with each other, the substrate being placed in the mount space of the package casing;

wherein the one end of the slender light transmitter is fixed in the groove.

wherein the light transmitter immediately adjacent to the optical element is fixed in the groove; and

a bonding member which connects the electric terminal of the package casing and the electrode pad on the substrate, the electric terminal being adapted to be electrically connected with an external circuit through a connector, wherein the substrate has a coupling portion coupled to the connector.

19. (Canceled)

20. (Previously presented) The optical module according to claim 18, further comprising a protector formed on the substrate for protecting the optical element and the one end of the slender light transmitter.

21. (Previously presented) The optical module according to claim 18, wherein the package casing is made of ceramic.

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22. (Currently amended) An optical module comprising:  
a package casing provided with an electric terminal on a surface thereof, the package casing having a mount space;

a substrate having a planar main surface and a groove in the main surface of the substrate, bearing a planer lightwave circuit and one end of an optical fiber which are fixedly attached on the substrate and optically coupled with each other, the substrate being placed in the mount space of the package casing;

wherein the one end of the optical fiber is fixed in the groove.

wherein the optical fiber immediately adjacent to the lightwave circuit is fixed in the groove; and

a bonding member which connects the electric terminal of the package casing and the planer lightwave circuit, the electric terminal being adapted to be electrically connected with an external circuit through a connector, wherein the substrate has a coupling portion coupled to the connector.

23. (Previously presented) The optical module according to claim 22, wherein the package casing is made of ceramic.

24. (Currently amended) A combination comprising:  
a connector including a receptacle, a module connection terminal, and a circuit board connection terminal electrically connected with the module connection terminal and connectable with an electric circuit board; and

an optical module including:

a package casing having a coupling portion to be received in the receptacle for the coupling of the connector and the optical module, and provided with an electric terminal on a surface of the coupling portion

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to be connected with the module connection terminal of the connector when the coupling portion is received in the receptacle, the package casing having a mount space;

a substrate having a planar main surface and a groove in the main surface of the substrate, bearing an optical element, an electrode drawn from the optical element, and one end of a slender light transmitter, the optical element and the one end of the slender light transmitter being fixedly attached on the substrate, and optically coupled with each other, the substrate being placed in the mount space of the package casing;

wherein the one end of the slender light transmitter is fixed in the groove.

wherein the light transmitter immediately adjacent to the optical element is fixed in the groove; and

a bonding member which connects the electric terminal of the package casing and the electrode pad on the substrate, wherein the substrate has a coupling portion coupled to a connector.

25. (Canceled)

26. (Previously presented) The combination according to claim 24, wherein the reception space is opened to the electric circuit board.

27. (Previously presented) The combination according to claim 26, wherein the module connection terminal provided in the connector has the form of a spring and is exposed to the receptacle.

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28. (Previously presented) The combination according to claim 24, wherein a main body of the connector is made of a material having a thermal conductivity higher than the first base member.

29. (Previously presented) The optical module according to claim 24, wherein the package casing is made of ceramic.